

Sulphate Analysis (Elementary)

Purpose: To determine if the water sample meets Canadian Drinking Water Guideline for Sulphate making a visual comparison of precipitate present. Testing will be done on Local community treated water; the teacher will do this as a demonstration. There is a 500 mg/L Canadian Drinking Water Guideline for sulphate in drinking water; you will test and compare your result to see if it meets these guidelines. **PLEASE NOTE:** If you are conducting this test in the USA, then the Sulphate standard that has been supplied with the kit is 250 mg / L.

Materials:

- 3 - Plastic cups
- 3 - Plastic pipettes
- 1 - Canadian Guideline for Sulphate sample (500 mg /L CAD; 250 mg/L USA)
- 3 - 5 mL vial containing 10 mL of Sulphate Reagent 1.
- 3 - 5 mL vial containing 15 mL of Sulphate Reagent 2

Method:

1. Label the 3 plastic cups with appropriate number, and name:
#1 - Control
#2 - Canadian Guideline
#3 - Local community treated water
2. Label the 3 pipettes: DI (for Deionized Water), SR1 (for Sulphate Reagent 1), and SR2 (for Sulphate Reagent 2).
3. Measure out 25ml of Deionized Water to each of the 5 cups.
4. To the #1 Control cup, add 2ml of the Deionized Water using the pipette labeled DI.
5. To the #1 Control cup, add 2ml of Sulphate Reagent 1 using the pipette labeled SR1.
6. To the #1 Control cup, add 3 mL of Sulphate Reagent 2 using the pipette labeled SR2, while swirling the contents of the cup. Continue swirling for 1 minute and then set the cup aside.
7. To the #2 cup, add contents of vial labeled Canadian Guideline.

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8. To the #2 cup, add 2ml of Sulphate Reagent 1 using the pipette labeled SR1.
9. To the #2 cup, add 3 mL of Sulphate Reagent 2 using the pipette labeled SR2, while swirling the contents of the cup. Continue swirling for 1 minute and then set the cup aside.
10. To the #3 Sample cup, add 2ml of Sample Water using a large pipette.
11. To the #3 Sample cup, add 2ml of Sulphate Reagent 1 using the pipette labeled SR1.
12. To the #3 Sample cup, add 3 mL of Sulphate Reagent 2 using the pipette labeled SR2, while swirling the contents of the cup. Continue swirling for 1 minute and then set the cup aside.
13. Determine the cloudiness of the cups **Relative to the** Canadian Guideline for Sulphate sample (more or less cloudy) and record the results.

Results:

The Canadian Guideline sample should be cloudy. The water sample may or may not be cloudy. If the water sample is less cloudy than the Canadian Guideline, then it passes the Canadian Drinking Water Guideline for Sulphate, which is 500 mg/L. The Control should not have any cloudiness present.

PLEASE NOTE: FOR USA kits: The guideline sample should be cloudy. The water sample may or may not be cloudy. If the water sample is less cloudy than the standard cup, then it passes the U.S. Environmental Protection Agency's guideline for Sulphate, which is 250 mg/L. The Control should not have any cloudiness present.

Safe Handling of Materials

Caution must be taken at all times when handling any chemicals. Although this test is safe to use in any area, please be cautious with the materials supplied.

Sulphate:

What is sulphate and why do we test for it?

Sulphur is a non-metallic element that is widely used for commercial and industrial purposes. Sulphur combines with oxygen to form the sulphate ion, SO_4 . Sulphate products are used in the manufacture of many chemicals, dyes, soaps, glass, paper, fungicides, insecticides, and several other things. They are also used in the mining, pulp, sewage treatment and leather processing industries. Aluminum sulphate (alum) is used in water treatment as a sedimentation agent, and copper sulphate has been used to control blue-green algae in raw and public water supplies.

Drinking water with excess sulphate concentrations often has a bitter taste and a strong 'rotten-egg' odour. Sulphate can also interfere with disinfection efficiency by scavenging residual chlorine in distribution systems. Sulphate salts are capable of increasing corrosion on metal pipes in the delivery system and sulphate-reducing bacteria may produce hydrogen sulphate which can give the water an unpleasant odour and taste and may increase corrosion of metal and concrete pipes.

What are the current Canadian limits for sulphate?

The current limits for sulphate in drinking water are based on aesthetic objectives and are set at $<500\text{mg/L}$, which is the taste threshold level.

What are the health risks associated with high or low sulphate levels?

There are no symptoms associated with sulphate deficiency. However, most people get the majority of their dietary sulphates through food and not from the water. High sulphate levels (1000 mg/L) have been shown to have a laxative effect on humans and can cause mild gastrointestinal irritation. Therefore, excessively high sulphate levels are usually investigated by water treatment authorities.



What do I do if my water exceeds the recommended sulphate limit?

Unfortunately, sulphate is not easily removed from drinking water as it is often in a form that is quite soluble in water. The most effective removal methods include distillation, reverse osmosis or electrodialysis. For home treatment reverse osmosis and distillation are most common.

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